



General

Guideline Title

The use of magnetic resonance imaging in the obstetric patient.

Bibliographic Source(s)

Patenaude Y, Pugash D, Lim K, Morin L, Diagnostic Imaging Committee, Lim K, Bly S, Butt K, Cargill Y, Davies G, Denis N, Hazlitt G, Morin L, Naud K, Ouellet A, Salem S. The use of magnetic resonance imaging in the obstetric patient. J Obstet Gynaecol Can. 2014 Apr;36(4):349-55. [PubMed](#)

Guideline Status

This is the current release of the guideline.

Recommendations

Major Recommendations

The quality of evidence assessment (I-III) and classification of recommendations (A-E, L) are defined at the end of the "Major Recommendations" field.

Summary Statements

1. Fetal magnetic resonance imaging (MRI) is safe at 3.0 tesla or less during the second and third trimesters. (II-2)
2. It is safe to continue breastfeeding after receiving a gadolinium contrast agent. (III)

Recommendations

1. Use of MRI during the first trimester of pregnancy should be restricted to maternal indications for which the information is considered clinically imperative. Inadvertent exposure to magnetic resonance imaging during the first trimester has not been associated with any long-term sequelae and should not raise clinical concern. (III-C)
2. Gadolinium contrast may be used in pregnant women when the benefits outweigh the potential risks. (III-C)

Definitions:

Quality of Evidence Assessment*

I: Evidence obtained from at least one properly randomized controlled trial

II-1: Evidence from well-designed controlled trials without randomization

II-2: Evidence from well-designed cohort (prospective or retrospective) or case-control studies, preferably from more than one centre or research group

II-3: Evidence obtained from comparisons between times or places with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of treatment with penicillin in the 1940s) could also be included in this category

III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees

*Adapted from The Evaluation of Evidence criteria described in the Canadian Task Force on Preventive Health Care.

Classification of Recommendations†

A. There is good evidence to recommend the clinical preventive action

B. There is fair evidence to recommend the clinical preventive action

C. The existing evidence is conflicting and does not allow to make a recommendation for or against use of the clinical preventive action; however, other factors may influence decision-making

D. There is fair evidence to recommend against the clinical preventive action

E. There is good evidence to recommend against the clinical preventive action

L. There is insufficient evidence (in quantity or quality) to make a recommendation; however, other factors may influence decision-making

†Adapted from the Classification of Recommendations criteria described in the Canadian Task Force on Preventive Health Care.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Conditions requiring magnetic resonance imaging (MRI) during pregnancy

Guideline Category

Diagnosis

Evaluation

Technology Assessment

Clinical Specialty

Obstetrics and Gynecology

Radiology

Intended Users

Allied Health Personnel

Health Care Providers

Health Plans

Hospitals

Physician Assistants

Physicians

Guideline Objective(s)

To review the biological effects and safety of magnetic resonance imaging (MRI) in the obstetric patient and to review procedural issues, indications, and contraindications for obstetrical MRI

Target Population

Pregnant and postnatal women

Interventions and Practices Considered

1. Obstetrical magnetic resonance imaging (MRI) in first trimester (restricted to clinically imperative indications)
2. Use of gadolinium contrast agents (if benefits outweigh risks)

Major Outcomes Considered

- Establishment of a framework for obstetrical magnetic resonance imaging (MRI) use
- Patient and clinician assurance of obstetrical MRI safety

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Searches of Unpublished Data

Description of Methods Used to Collect/Select the Evidence

Published literature was retrieved through searches of PubMed or MEDLINE in 2013 using controlled vocabulary and key words (e.g., MRI, safety, pregnancy). Results were restricted to systematic reviews, randomized control trials/controlled clinical trials, and observational studies published in English and in French. There were no date restrictions. Searches were updated on a regular basis and incorporated in the guideline to July 2013. Grey (unpublished) literature was identified through searching the websites of health technology assessment and health technology related agencies, clinical practice guideline collections, clinical trial registries, and national and international medical specialty societies.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Quality of Evidence Assessment*

I: Evidence obtained from at least one properly randomized controlled trial

II-1: Evidence from well-designed controlled trials without randomization

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III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees

*Adapted from The Evaluation of Evidence criteria described in the Canadian Task Force on Preventive Health Care.

Methods Used to Analyze the Evidence

Systematic Review

Description of the Methods Used to Analyze the Evidence

The quality of evidence was rated using the criteria described in the Report of the Canadian Task Force on Preventive Health Care (see the "Rating Scheme for the Strength of the Evidence" field).

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Not stated

Rating Scheme for the Strength of the Recommendations

Classification of Recommendations†

A. There is good evidence to recommend the clinical preventive action

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C. The existing evidence is conflicting and does not allow to make a recommendation for or against use of the clinical preventive action; however, other factors may influence decision-making

D. There is fair evidence to recommend against the clinical preventive action

E. There is good evidence to recommend against the clinical preventive action

L. There is insufficient evidence (in quantity or quality) to make a recommendation; however, other factors may influence decision-making

†Adapted from the Classification of Recommendations criteria described in the Canadian Task Force on Preventive Health Care.

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

This clinical practice guideline has been prepared by the Diagnostic Imaging Committee, reviewed by the Family Physician Advisory Committee, and approved by the Executive and Council of the Society of Obstetricians and Gynaecologists of Canada.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate and safe use of magnetic resonance imaging (MRI) in the obstetrical patient

Potential Harms

- Maternal risks associated with the use of magnetic resonance imaging (MRI) are the same as for non-pregnant patients. One safety consideration for the obstetrical patient is prolonged supine positioning. A gravid uterus of significant size can lead to hypotension due to compression of the inferior vena cava. This can be avoided by placing the patient in a lateral oblique or lateral decubitus position.
- Theoretical fetal concerns include teratogenic and biological effects. It is known that MRI may cause effects at the cellular level from the induction of local electric fields, currents from static and time-varying magnetic fields, and tissue and cellular heating from radiofrequency (RF) fields.
- To date there is insufficient evidence to understand the true risks of first trimester exposure to the developing fetus. Until these theoretical concerns can be appropriately addressed, the guideline developers advocate a cautious approach to using obstetrical MRI in the first trimester.
- Gadolinium crosses the placenta and is excreted by the fetal kidneys into the amniotic fluid, where it remains, exposing the developing fetus, particularly the lungs and gastrointestinal tract, for an extended period of time. The risks and benefits of gadolinium use must be discussed with the pregnant patient and referring clinician. Despite animal data and concerns about the use of gadolinium in pregnancy, there have been no reported adverse human fetal effects. However, many authors remain cautious about the use of gadolinium at any time in pregnancy.
- Obstetrical MRI can be technically challenging to perform and interpret given the movement of the fetus and its variable lie and presentation. The imaging protocol must be altered when the fetus moves or if new anomalies are detected in the course of the scan.
- Slice thickness between 2.5 and 5 mm is used in examining most fetal structures. Thinner slices are possible but have adverse effects on signal-to-noise ratio. At present, the minimum voxel size that may be obtained with fetal MRI is $0.8 \times 0.8 \times 2.5$ mm, with slice thickness and fetal-maternal movement the major limiting factors. These factors decrease resolution and may obscure structures smaller than 1 mm and create difficulties in accurately measuring small or thin structures.

Qualifying Statements

Qualifying Statements

This document reflects emerging clinical and scientific advances on the date issued and is subject to change. The information should not be construed as dictating an exclusive course of treatment or procedure to be followed. Local institutions can dictate amendments to these opinions. They should be well documented if modified at the local level. None of these contents may be reproduced in any form without prior written permission of the Society of Obstetricians and Gynaecologists of Canada (SOGC).

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Foreign Language Translations

For information about availability, see the *Availability of Companion Documents and Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Safety

Identifying Information and Availability

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Adaptation

Not applicable. The guideline was not adapted from another source.

Date Released

2014 Apr

Guideline Developer(s)

Society of Obstetricians and Gynaecologists of Canada - Medical Specialty Society

Source(s) of Funding

Society of Obstetricians and Gynaecologists of Canada (SOGC)

Guideline Committee

Diagnostic Imaging Committee

Composition of Group That Authored the Guideline

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Financial Disclosures/Conflicts of Interest

Disclosure statements have been received from all contributors.

Guideline Status

This is the current release of the guideline.

Guideline Availability

Electronic copies: Available in Portable Document Format (PDF) from the [Society of Obstetricians and Gynaecologists of Canada \(SOGC\) Web site](#) . Also available in French from the [SOGC Web site](#) .

Print copies: Available from the Society of Obstetricians and Gynaecologists of Canada, La société des obstétriciens et gynécologues du Canada (SOGC) 780 promenade Echo Drive Ottawa, ON K1S 5R7 (Canada); Phone: 1-800-561-2416.

Availability of Companion Documents

None available

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI Institute on May 19, 2014. The information was verified by the guideline developer on June 4, 2014.

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